# ACTIVITY #43: SETTING THE MAXIMUM GREEN TIMING PARAMETER FOR ALL APPROACHES OF AN INTERSECTION (DESIGN)

## Purpose

The purpose of this activity is to set the maximum green time for your intersection such that the delay is optimized for all approaches and for the intersection as a whole.

## Learning Objective

Set the maximum green time for all phases of an intersection, balancing the performance of both the minor street and the major street.

## Required Resource

VISSIM file from Activity #36.

## Information

Consider this question: How do you set the timing parameters to balance the risks of early termination of green and inefficiently long green time? Consider the following criteria that could be used to produce efficient phase operations:

- The phase is not extended inefficiently for a very short queue.
- The phase extends long enough to clear the standing queue.
- The phase doesn't extend beyond the time that it takes for the queue to clear.

In addition to these three criteria, the following criteria could also be considered to achieve intersection operational efficiency:

- The major street green time should be extended to serve vehicles arriving after the queue clears without causing excessive delay to the minor street traffic.
- The maximum green time should be increased in case of phase failure when a phase consistently terminates by maxing out.

Your objective in this activity is to determine the maximum green times such that the phases generally gap out (and not max out) balanced by making sure the cycle times are not excessive and long delay times are produced.

## Tasks

**Task 1**: Make a new copy of the folder that includes your VISSIM files from Activity #36. Rename this folder "a43". Use this VISSIM file as the basis for your analysis and design of the maximum green time.

**Task 2**: Prepare your simulation file.

- Set the maximum green time to 60 seconds for all phases of your intersection.
- Use the settings for the minimum green time and the vehicle extension time that you determined in Activity #36.
- Check that your volumes are the same as for the base case (Activity #28), and not the increased volumes used for the initial part of Activity #36.

**Task 3**: Run the simulation for 3600 seconds, collecting evaluation data beginning at 300 seconds to account for network build-up.

- Collect green time distribution data ("Direct Output" on Evaluation Configuration dialog box.
- Collect delay and queue length data for each approach and for the intersection as a whole
- Observe the operation of the network for this time period and note any traffic operational problems.
- Using the green time distribution data for one approach on the major street, record the total number of cycles and the number of times that the green time reaches or exceeds the maximum green time.

**Task 4**: Reduce the maximum green times by 10 seconds for each phase and run the simulation again. Repeat the four bullets listed in Task 3.

**Task 5**: Continue iterating (reducing the maximum green by increments of 10 seconds and re-run the simulation as described in Task 4) until you've reached a value of maximum green time that you believe best meets the objectives listed above.

**Task 6**: Based on the results from tasks 3, 4, and 5, select your design value for the maximum green time.

**Task 7**: Run the simulation with your final value for the maximum green time. Record the performance data (average delay and queue length) and compare with the data previously gathered from Activities #28 and #36.

**Task 8**: Read Section 6.1.4 in the Signal Timing Manual (STM) on the maximum green time (pp 6.8-6.10). How does your selected value of the maximum green time compare with the range of values discussed in the STM?

## Deliverable

Prepare a spreadsheet that includes the analysis and reporting requirements listed in the tasks below:

- **Tab 1**: Title page with activity number and title, authors, and date completed.
- **Tab 2**: Delay analysis for range of maximum green times considered (Tasks 3-5). Include both tabular comparisons and graphical comparisons for the intersection and for the individual approaches. Briefly discuss the results from this analysis.
- **Tab 3**: The methods of phase termination (gap out, max out) for each of the maximum green times that you studied in Tasks 3-5 using the green time duration data. Briefly discuss the meaning of these results.
- **Tab 4**: A brief report that summarizes your conclusions, your recommended maximum green times, and the data that support your conclusions and recommendations. Include a comparison of the delay data from this activity with the data from Activities #28 and #36 (Task 7). Discuss how your maximum green time results compare with the reading from the STM (Task 8). Based on this reading, would you make any change to your design value?